

CLAIMS

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5 1. An input voice pitch normalization device equipped in a voice recognition device for recognizing an input voice uttered by unlimited speakers based on voice recognition sample data, and used to change a pitch of the input voice to be in a predetermined relationship with a pitch of the voice recognition sample data, said input voice pitch normalization device comprising:

pitch difference determination means for determining a pitch difference between said input voice and said voice recognition sample data; and

10 pitch change means for changing, on the basis of the pitch difference determined by said pitch difference determination means, said input voice in frequency to make the pitch of the input voice have the predetermined relationship with the pitch of said voice recognition sample data.

2. The input voice pitch normalization device as claimed in claim 1, further comprising:

memory means for temporarily storing said input voice; and

5 read-out control means for reading a string of said input voice from said memory means, and generating a recognition target voice signal, and

said pitch difference determination means comprising:

frequency component analysis means for analyzing a

frequency component in said recognition target voice signal, and
10 generating a frequency component signal; and

pitch determination means for finding a base frequency of
said recognition target voice signal based on said frequency
component signal, and determining a pitch difference between said
voice recognition sample data and the base frequency to generate
15 a pitch difference signal.

3. The input voice pitch normalization device as claimed
in claim 2, wherein said pitch determination means can stably
determine the pitch difference regardless of said recognition
target voice as being structured by a single or several sound units
5 by finding a first formant of said recognition target voice signal
as the base frequency, and by comparing the first formant of the
recognition target voice signal with a first formant of said voice
recognition sample data to find said pitch difference
therebetween.

4. The input voice pitch normalization device as claimed
in claim 3; wherein said pitch change means comprises

read-out clock control means for generating a read-out
clock signal by determining a frequency of a timing clock at the
5 time of reading from said memory in such a manner that a frequency
of said recognition target voice signal is changed based on said
pitch difference signal, and

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said memory outputs, based on said read-out clock, said
recognition target voice signal in such a manner that a
10 predetermined relationship in pitch is established with said
voice recognition sample data.

5. A voice recognition device including the input voice
pitch normalization device of claim 4.

6. A voice recognition device for recognizing an input
voice uttered by unlimited speakers based on voice recognition
sample data, said device comprising:

an input voice pitch normalization device for changing a
5 pitch of the input voice to be in a predetermined relationship
with a pitch of the voice recognition sample data; and

voice analysis means for comparing said input voice changed
in pitch and said voice recognition sample data to generate a
recognition signal indicating the voice recognition sample data
10 which coincides with the input voice.

7. The voice recognition device as claimed in claim 6,
further comprising:

memory means for temporarily storing said input voice; and
read-out control means for reading a string of said input
5 voice from said memory means, and generating a recognition target
voice signal, and

said pitch difference determination means comprising:

frequency component analysis means for analyzing a frequency component of said recognition target voice signal, and
10 generating a frequency component signal; and

pitch determination means for finding a base frequency of said recognition target voice signal based on said frequency component signal, and determining a pitch difference between said voice recognition sample data and the base frequency
15 to generate a pitch difference signal.

8. The voice recognition device as claimed in claim 7, wherein said pitch determination means can stably determine the pitch difference regardless of said recognition target voice as being structured by a single or several sound units by finding
5 a first formant of said recognition target voice signal as the base frequency, and by comparing the first formant of the recognition target voice signal with a first formant of said voice recognition sample data to find said pitch difference therebetween.

9. The voice recognition device as claimed in claim 8, wherein said pitch change means comprises

read-out clock control means for generating a read-out clock signal by determining a frequency of a timing clock at the
5 time of reading from said memory in such a manner that a frequency

said memory outputs, based on said read-out clock, said recognition target voice signal in such a manner that a predetermined relationship in pitch is established with said voice recognition sample data.

said memory outputs, based on said read-out clock, said recognition target voice signal in such a manner that a predetermined relationship in pitch is established with said voice recognition sample data.

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voice/recognition sample data.